Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of	)	WT Docket No. 10-4
the Commission's Rules to Improve Wireless	)	
Coverage Through the Use of Signal Boosters	)	

PETITION FOR RECONSIDERATION OF V-COMM, L.L.C., VERIZON WIRELESS AND WILSON ELECTRONICS

V-COMM, L.L.C., Verizon Wireless, and Wilson Electronics ("Joint Petitioners"), pursuant to Section 1.429 of the Commission's Rules,[1] hereby request that the Commission reconsider and amend the signal booster rules adopted in its Report and Order.[2] Although Joint Petitioners generally support the signal booster rules adopted by the Commission and appreciate the Commission's willingness to work with the industry to adopt consensus rules for signal boosters, they believe small but significant changes in those rules are necessary to protect consumers and licensees from harmful interference.

The provider-specific consumer booster technical requirements proposed initially by Joint Petitioners, Nextivity and T-Mobile[3] and subsequently adopted by the Commission were

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[1] 47 C.F.R. § 1.429.

[2] *Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of the Commission's Rules to Improve Wireless Coverage Through the Use of Signal Boosters*, Report and Order, 28 FCC Rcd 1663 (2013) ("*Booster Order*").

[3] *See* Letter from Nextivity, Inc., T-Mobile, USA, Inc., V-COMM, L.L.C., Verizon Wireless, and Wilson Electronics to Marlene H. Dortch, WT Docket No. 10-4 (filed June 8, 2012).

not designed for mobile use. The higher noise and gain limits allowed for such boosters will cause interference to nearby devices operating on adjacent licensee networks, diminish 911 location accuracy, and cause interference to adjacent licensee base stations. For these reasons, the Commission should amend its rules to require that provider-specific boosters be operated in fixed, in-building locations only. The Commission should also amend the provider-specific booster antenna kitting rules to eliminate the separate requirement for mobile boosters and conform that requirement to the wideband consumer booster antenna kitting rule. Finally, the Commission should require that all boosters designed and certified for fixed, in-building use be labeled to notify customers that such boosters may only be used in fixed environments.[4]

I. BACKGROUND

On July 25, 2011, in response to the Notice of Proposed Rulemaking adopted by the Commission the previous April, Verizon Wireless, V-COMM, a wireless engineering consulting firm, and Wilson Electronics, a leading manufacturer of signal booster products, submitted a jointly developed proposal for the design and operation of signal boosters.[5] The Joint Proposal advocated establishing three categories of signal boosters: (1) Consumer Boosters; (2) Certified Engineered and Operated ("CEO") Boosters; and (3) Carrier Installed Boosters, and proposed technical requirements for wideband consumer signal boosters.

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[4] Verizon understands that Wilson Electronics is concurrently filing a petition for reconsideration proposing amended wideband consumer booster technical requirements for downlink noise and downlink gain. Verizon supports that petition, which overcomes complications in test procedure requirements identified for equipment certification testing of downlink noise in the presence of downlink signals through the consumer booster, among other reasons provided in the petition.

[5] Letter from Verizon Wireless and Wilson Electronics to Marlene H. Dortch, Secretary, FCC, WT Docket No. 10-4, filed July 25, 2011 ("Joint Proposal"). The Joint Proposal was also attached to Verizon Wireless Comments in Docket No. 10-4, which were also filed on July 25, 2011.

On February 17, 2012, T-Mobile and Nextivity, a signal booster manufacturer, jointly filed a different recommendation for signal boosters.[6] In an effort to achieve a consensus proposal and at the urging of Commission staff, Nextivity, T-Mobile, Verizon, V-COMM and Wilson began discussions towards a single set of consumer booster protection standards. Early on, however, it became clear that the type of signal booster contemplated by Nextivity and T-Mobile was different from that envisioned by Verizon, V-COMM and Wilson. In particular, Nextivity and T-Mobile wanted to build and allow T-Mobile's subscribers to operate a signal booster that would operate on a single carrier's frequency block and would provide coverage primarily in fixed, in-building locations. Accordingly, the parties decided that two separate consumer signal booster protection standards were warranted: one for wideband fixed and mobile consumer boosters and one for provider-specific fixed consumer boosters. Because the provider-specific consumer booster would not be capable of operating on adjacent carrier frequency blocks and would not be operated in a mobile environment, the parties proposed less stringent interference protection limitations for booster gain and noise for provider-specific consumer boosters. These relaxed limitations were deemed desirable to allow for better in-building coverage and performance.

The parties were able to agree on the two consumer protection standards and jointly submitted those technical standards to the Commission on June 8, 2012.[7] Finding those protection standards "appropriately balance the need to protect wireless networks with the need to provide consumers with affordable signal booster options," the Commission adopted those

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[6] Letter from Steve Sharkey, T-Mobile, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 10-4, filed February 17, 2012.

[7] Letter from Nextivity, Inc., T-Mobile, USA, Inc., V-COMM, L.L.C., Verizon Wireless and Wilson Electronics to Marlene H. Dortch, Secretary, FCC, WT Docket No. 10-4, filed June 8, 2012 ("Second Joint Proposal").

protection standards without significant change.[8] The Commission did, however, change the definition of provider-specific consumer signal boosters, primarily by eliminating the requirement that these boosters must be operated in a fixed environment.[9]

II. THE COMMISSION SHOULD AMEND ITS SIGNAL BOOSTERS RULES TO REQUIRE PROVIDER-SPECIFIC CONSUMER SIGNAL BOOSTERS TO OPERATE IN FIXED LOCATIONS ONLY.

A. The Provider-Specific Signal Booster Technical Requirements Were Not Designed to Protect Against Interference in a Mobile Environment.

Provider-specific consumer booster technical requirements do not adequately protect against harmful interference in mobile use scenarios. The provider-specific booster technical requirements were not designed for mobile use scenarios and the consequences of using a provider-specific booster in mobile applications were not considered by any commenter in the proceeding.

The provider-specific consumer booster technical specifications were designed to allow such boosters to operate on a single carrier's frequency blocks and cover fixed locations, such as a residence or small to medium office space (i.e., coverage area of 5000 sq. ft.). Providing the same coverage in a mobile vehicle (i.e., coverage area under 50 sq. ft., or 1/100 the area) was not contemplated in developing the technical specifications for provider-specific boosters and can cause significant problems in areas outside the mobile vehicle.

The provider-specific consumer signal booster technical requirements allow significantly higher out-of-band noise and overall gain than the technical specifications for wideband

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[8] *See* Booster Order at para. 71.

[9] *Compare* Second Joint Proposal, Consumer Booster Safe Harbor Protection Standard 2, definition of frequency selective consumer booster *with Booster Order*, new Section 20.3, definition of provider-specific consumer signal boosters, codified at 47 C.F.R. § 20.3.

consumer signal boosters. The wide-band consumer booster noise limit is -59 dBm/MHz for mobile applications,[10] whereas the out-of-band noise limit for provider-specific consumer boosters is up to -37 dBm/MHz in downlink spectrum,[11] and up to -3 dBm/MHz for uplink spectrum depending on downlink received signal strength indicator (RSSI) measurements.[12] Thus, the rules permit significantly higher noise limits for provider-specific consumer boosters relative to wide-band consumer boosters for mobile applications. When outdoors under line-of-sight conditions, this 22 dB higher noise level transmitted from the provider-specific booster on the downlink spectrum would extend 12.6 times farther outside the vehicle compared to the wideband mobile booster.

The wide-band consumer booster gain limits are 15, 23, and 50 dB for mobile applications, depending on the antenna configuration used within the vehicle,[13] compared to the provider-specific consumer boosters rules, which permit up to 100 dB of gain.[14] The rules also allow out-of-band gain up to 60 dB for provider-specific boosters.[15] Thus, the rules permit

[10] 47 C.F.R. § 20.21(e)(8)(i)(A)(2)(ii).

[11] 47 C.F.R. § 20.21(e)(9)(i)(A)(2).

[12] 47 C.F.R. § 20.21(e)(9)(i)(A)(1).

[13] 47 C.F.R. § 20.21(e)(8)(i)(C)(2)(iii).

[14] 47 C.F.R. § 20.21(e)(9)(i)(C)(2).

[15] 47 C.F.R. § 20.21(e)(9)(i)(E).

significantly higher gain limits (many tens of dB) for provider-specific consumer boosters compared to the wide-band consumer booster for mobile applications.[16]

The significantly higher noise and gain limits permitted for provider-specific consumer boosters will cause the signal from such boosters to extend significantly far (up to 100 feet) outside the vehicle in which it is mounted. This will result in co-channel interference to nearby devices and base stations operating on adjacent frequency blocks.

B. The Higher Noise and Gain Limits for Provider-Specific Signal Boosters Will Cause Harmful Interference and Diminish 911 Location Accuracy for Nearby Devices.

The higher noise and gain limits will also cause nearby devices operating on adjacent licensee frequency blocks to receive downlink noise from the mobile frequency-specific booster. This noise will increase the noise floor for nearby devices, making them less able to receive weak signals from the serving base station. As a result, nearby users may drop their connection, fail to connect, or suffer a degradation of service.[17] Because these effects are experienced by subscribers of licensees other than the licensee(s) that approve the provider-specific booster, the

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[16] In addition, the rules for provider-specific boosters do not limit the in-band noise transmitted into uplink or downlink spectrum bands as they do for wide-band consumer boosters. The provider-specific booster would be permitted to operate with *out-of-band* gain that is 10 to 45 dB higher than the in-band gain of wideband mobile boosters, which could affect adjacent band subscribers. Oscillation and interference to nearby base stations and mobiles due to increased noise transmitted in-band and out-of-band would be caused by such provider-specific boosters with inappropriately high gain and limited antenna isolation in these mobile applications.

[17] While nearby adjacent band devices in a home or office can also be affected by provider-specific boosters, the presence of walls and other obstacles in building will attenuate the signal and significantly reduce the potential effects. In a vehicle, there are no obstacles to attenuate the signal, so the effects will be much more significant.

licensee(s) approving the booster cannot be expected or relied upon to protect against these harms.[18]

In addition, the higher noise and gain limits allowed for provider-specific boosters could disrupt E911 calls and diminish location accuracy for users in the vicinity of the provider-specific booster. The higher gain allowed for provider-specific consumer boosters used in mobile applications will cause devices outside of the vehicle in which the booster is operating to receive multiple signals, causing time delays resulting in location inaccuracies for such devices. Users of these devices will not be aware that their location fix is at risk because they will not have access to the E911 location accuracy warning label on the booster.[19]

C. The Higher Noise and Gain Limits for Provider-Specific Signal Boosters Will Cause Harmful Interference to Adjacent Licensee Base Stations.

The use of provider-specific boosters in mobile applications will also cause harmful interference in the form of out-of-band noise to adjacent band base stations, leading to reduced coverage and capacity and dropped calls. Out-of-band noise in the uplink spectrum is limited in the technical specifications by the RSSI noise limit.[20] The RSSI noise limit in the technical rules for provider-specific boosters is appropriate, but it will only protect adjacent licensee base

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[18] Another potential concern is that provider-specific boosters are required to operate only on the approving licensee(s) frequency bands. Yet in a mobile environment, particularly when operating near or when crossing market boundaries, the booster may operate outside of the approving licensee(s) bands due to timing and band switching issues. Because carriers periodically change their licensed bands, frequent updates would be needed to ensure boosters operate only on the appropriate frequency bands.

[19] The E911 accuracy impacts are more likely to affect users in a mobile environment both because of the booster signal will propagate farther, affecting more devices, and because location inaccuracies in a mobile environment could be more detrimental than inaccuracies within a building.

[20] *See* 47 C.F.R. §§ 20.21(e)(8)(i)(A)(1), 20.21(e)(9)(i)(A)(1).

stations from harmful interference in a mobile environment if the booster adjusts the out-of-band noise to comply with the limit as it moves closer to adjacent licensee base stations. If the booster adjusts too slowly, it will cause interference before it adjusts to meet the limit. Even several seconds of increased noise to an adjacent frequency block base station can cause significant harmful interference, including numerous dropped calls on the network. When interference occurs during these mobile applications, due to the nomadic nature of these boosters, it will be almost impossible to track, identify and locate. Because provider-specific boosters are not designed to comply with the appropriate RSSI noise limit in a mobile environment and are permitted to operate with significantly higher noise and gain limits that are not suitable for mobile environments, such boosters should be limited to fixed applications.

D. The Commission Should Amend its Rules to Require Provider-Specific Consumer Signal Boosters to Operate in Fixed Indoor Locations Only.

To prevent provider-specific consumer signal boosters from causing interference to devices operating in adjacent licensee spectrum blocks, from diminishing 911 accuracy, and from causing interference to adjacent licensee base stations, the Commission should amend the signal booster rules to require that provider-specific consumer boosters may be operated only in fixed, in-building locations. To make this change, the Commission should amend Section 20.3, definition of Provider-Specific Consumer Signal Boosters, to read "Provider-Specific Consumer Signal Boosters may only *be operated in a fixed location in a building and* may only operate on the frequencies and in the market areas of the specified licensee(s). Provider-Specific Consumer Signal Boosters may only be certified and operated with the consent of the licensee(s) whose frequencies are being amplified by the device." (Recommended changes are in italics.)

III. THE COMMISSION SHOULD AMEND ITS BOOSTER ANTENNA KITTING RULES FOR PROVIDER-SPECIFIC CONSUMER SIGNAL BOOSTERS TO ELIMINATE THE SEPARATE REQUIREMENT FOR MOBILE BOOSTERS.

The Commission should also amend the provider-specific booster antenna kitting rule to eliminate the separate requirement for mobile consumer boosters and to be consistent with the antenna kitting requirement for wideband consumer signal boosters. Since the wideband booster antenna kitting requirement applies to both mobile and fixed wideband consumer boosters, and since Joint Petitioners request that provider-specific consumer boosters be limited to fixed applications only, there is no need for the requirements to be different or for the provider-specific booster kitting rule to have a separate mobile booster requirement. Accordingly, the provider-specific booster antenna kitting requirement should be replaced with the wideband consumer booster kitting requirement found in Section 20.21(e)(8)(i)(G) of the Commission's rules.[21]

IV. THE COMMISSION SHOULD REQUIRE FIXED CONSUMER SIGNAL BOOSTERS TO BE LABELED FOR FIXED IN-BUILDING USE ONLY.

Assuming the Commission makes the changes recommended by Joint Petitioners above, it should also require that provider-specific consumer boosters be labeled to notify consumers that such boosters can be operated only in fixed, in-building locations. Because the wideband consumer booster technical standards differ depending on whether the wideband booster will be used in fixed or mobile environments, those designed for fixed, in-building use should also be labeled to notify customers that the booster may only be used in fixed, in-building locations. In particular, in addition to the labeling requirements for consumer signal boosters set forth in Section 20.21(f) of the rules,[22] the Commission should require wideband consumer signal

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[21] 47 C.F.R. §20.21(e)(8)(i)(G).

[22] 47 C.F.R. §20.21(f).

boosters certified for fixed operation only and all provider-specific consumer boosters to include the following label: "You must operate this device in a fixed in-building location only." This additional labeling requirement is necessary to inform purchasers of fixed consumer boosters that they may not lawfully be installed and operated in a moving vehicle or outdoor location.

V. CONCLUSION

For the reasons set forth above, the Commission should amend its rules to require that provider-specific boosters be operated in fixed, in-building locations only. The Commission should also amend the provider-specific booster antenna kitting rules to eliminate the separate requirement for mobile boosters and conform that requirement to the wideband consumer booster antenna kitting rule. Finally, the Commission should require that all boosters designed and certified for fixed, in-building use be labeled to notify customers that such boosters may only be used in fixed environments.

Respectfully submitted,

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